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TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR Unassigned 10/088435	
INTERNATIONAL APPLICATION NO. PCT/AU00/01089		INTERNATIONAL FILING DATE 13 September 2000 (13.09.00)		PRIORITY DATE CLAIMED 14 September 1999 (14.09.99)	
TITLE OF INVENTION GLUTEN SUBSTITUTES					
APPLICANT(S) FOR DO/EO/US Frank Uhlik					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
<ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (24) indicated below. 4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31). 5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371 (c) (2)) <ol style="list-style-type: none"> a. <input type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau). b. <input checked="" type="checkbox"/> has been communicated by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US). 6. <input type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)). <ol style="list-style-type: none"> a. <input type="checkbox"/> is attached hereto. b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4). 7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3)) <ol style="list-style-type: none"> a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau). b. <input type="checkbox"/> have been communicated by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input checked="" type="checkbox"/> have not been made and will not be made. 8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). 9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)). 10. <input type="checkbox"/> An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)). 11. <input checked="" type="checkbox"/> A copy of the International Preliminary Examination Report (PCT/IPEA/409). 12. <input checked="" type="checkbox"/> A copy of the International Search Report (PCT/ISA/210). 					
<p>Items 13 to 20 below concern document(s) or information included:</p> <ol style="list-style-type: none"> 13. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98. 14. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included. 15. <input type="checkbox"/> A FIRST preliminary amendment. 16. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment. 17. <input type="checkbox"/> A substitute specification. 18. <input type="checkbox"/> A change of power of attorney and/or address letter. 19. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825. 20. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4). 21. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4). 22. <input checked="" type="checkbox"/> Certificate of Mailing by Express Mail 23. <input checked="" type="checkbox"/> Other items or information: 					
<p>Courtesy Copy of International Application "Small Entity status is entitled to be asserted in respect to the above-identified patent application"</p>					

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GLUTEN SUBSTITUTES

FIELD OF THE INVENTION

The present invention relates generally to the preparation of food products that are typically produced using wheat flour. More particularly, the present invention relates to novel gluten substitutes and methods for their production for use *inter alia* in the preparation of bread, cake and pastry-type products.

BACKGROUND OF THE INVENTION

Bakery products are commonly made from wheat flour containing gluten, which contributes to the typical texture, flavour and form of the usual bread, cake and pastry products. A substantial segment of the population, however, suffers from dietary wheat intolerance such as celiac disease and other less well-defined wheat intolerances and allergies which make wheat based products unacceptable for use. Unfortunately, these people have few alternatives for conventional baked products.

Despite the desirability of developing bakery products that are not based on wheat flour, this development has been hindered largely by the unavailability of alternative compounds that mimic the critical role that gluten plays in the baking process. Gluten is especially important in this regard because of its unique ability to form the viscoelastic matrix of dough, which transforms it into a firm loaf of bread when baked. However, gluten-free flours typically have very little, if any, binding capacity and consequently, form pastes or slurries instead of dough when mixed with yeast and water.

Current methods for producing gluten-free bread, for example, include mixing gluten-free flour with water, eggs, salt, sugar, yeast, milk and a small amount of binding agent (0.5 to 5.0% by weight), usually xanthan gum, guar gum, or pre-gelatinized starch typically referred to as a gluten substitute. Unfortunately, the resulting breads are very cake-like and heavy whilst their mouth feel and texture are generally unpleasant. As a result, many gluten intolerant individuals avert eating bread products all together.

By further example, dough can be made from gluten-free flour mixed with commercially available gluten. If the gluten is mixed with these flours in the amount of 15

25 In yet another aspect, the invention resides in food products including bakery products produced using the gluten substitute gum as broadly described above.

DETAILED DESCRIPTION OF THE INVENTION

1. Definitions

Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood by those of ordinary skill in the art to which the invention belongs. Although any methods and materials similar or equivalent to those
5 described herein can be used in the practice or testing of the present invention, preferred methods and materials are described. For the purposes of the present invention, the following terms are defined below.

The articles "*a*" and "*an*" are used herein to refer to one or to more than one (i.e.
10 to at least one) of the grammatical object of the article. By way of example, "*an element*" means one element or more than one element.

Throughout this specification, unless the context requires otherwise, the words "*comprise*", "*comprises*" and "*comprising*" will be understood to imply the inclusion of a stated step or element or group of steps or elements but not the exclusion of any other step
15 or element or group of steps or elements.

By "*edible fat*" or "*edible protein*" is meant a fat or protein that is fit or safe for animal consumption including human consumption.

2. Gluten substitute gum

The present invention is predicated in part on the discovery that a gluten substitute
20 gum can be produced by heating a mixture, preferably an aqueous mixture comprising a starch, an edible fat and an edible protein for a time and under conditions sufficient to produce an aerated mass with gluten-like properties. The invention thus provides a method of producing a gluten substitute gum, comprising heating an mixture comprising a starch, an edible fat, an edible protein and a liquid, preferably water, for a time and under
25 conditions sufficient to form an aerated mass.

Preferably, the starch is present in an amount of between about 20 and 80% by weight, more preferably between about 30 and 70% by weight and even more preferably between about 40 and 60% by weight of said mixture.

include but are not limited to, gelatin, whey and egg white. Exemplary plant proteins include soybean protein and rice protein.

Preferably, the edible protein is present in an amount of between about 2 and 20% by weight, more preferably between about 2 and 12% by weight and even more preferably
5 between about 2 and 8% by weight of said mixture.

It is preferred that the edible protein to starch ratio in said mixture is less than about 30:100, more preferably less than about 25:100, more preferably less than 20:100.

Preferably, the edible protein to edible fat ratio is about 3:1, more preferably about 2.5:1 and still more preferably about 2:1.

10 Water is preferably present in said mixture in an amount of between about 20 and 80% by weight, more preferably between about 30 and 70% by weight and even more preferably between about 40 and 60% by weight of said mixture

In a preferred embodiment, the edible fat and the edible protein are obtained from or provided in the form of a foodstuff comprising both the edible fat and the edible protein.
15 For example, the foodstuff may be selected from milk or other dairy products, eggs, vegetables. Preferably, the foodstuff is a gluten-free flour such as, for example, buckwheat flour, sorghum flour, maize flour, white rice flour and soybean flour. More preferably, the foodstuff is soybean flour.

Preferably, the mixture is heated to a temperature of between about 110 and
20 150 °C, more preferably between about 120 and about 140 °C, more preferably between about 125 and 135 °C and still more preferably between about 130 and 133 °C.

Any mode of heating, which is suitable for the formation of the aerated mass, is contemplated by the present invention. Preferably heating is effected by microwaves. Alternatively, the heating can be carried out by use of a compression means such as an
25 extruder.

Suitably, the mixture is heated for a time sufficient to produce the aerated mass without burning.

Preferably, the method further comprises drying the aerated mass. The drying

under conditions sufficient to form an aerated mass.

The invention also encompasses a mix for the preparation of bakery products. The mix comprises the gluten substitute gum of the invention together with a gluten-free starch in relative amounts sufficient to form a coherent dough system upon the addition of
5 water, and to retain leavening gas during the preparation of said dough. The ratio of starch to gluten-substitute gum will vary depending on the intended purpose of the mix. However, for most bakery products the ratio of starch to gluten-substitute gum is preferably in the range of about 6:1 to 7:1.

It will be appreciated that the gluten-substitute gum of the invention can thus be
10 used to prepare various mixes for cakes, pastries and bread products. These mixes can include other standard ingredients known *per se* in the art and the choice and grade of said other ingredients in a complete mix are not critically related to the invention and may follow standard practice in the art. Thus, the invention contemplates use of any of the usual basic gas producing chemical leavening substances as well as flavorings in the
15 aforesaid mixes.

Accordingly, the invention also provides a method for producing bakery products. The method comprises mixing the gluten substitute gum of the invention together with a gluten-free starch and water and optionally other ingredients to form a dough and heating the dough for a time and at a temperature sufficient to produce said bakery products.

20 Bakery products contemplated by the present invention include, but are not restricted to, flour, bread, buns, rolls, bagels, pizza base, pies, pastry, pancakes, muffins, crumpets, doughnuts, cakes, batter, biscuits, cake mixes, dumplings, and pasta.

The invention also encompasses any food products produced using the gluten substitute gum of the invention. In this connection, the subject gluten substitute gum has
25 excellent thickening and binding properties. Accordingly, the gum can be advantageously used as a food additive, both for human and animal consumption. For example, when the gluten substitute gum is used as a thickener, it can compete effectively with modified starches, xanthan, guar and many other gums. Exemplary foodstuffs which can be prepared using the present gluten substitute gum include, for example, sauces, soups,

pastes, mayonnaise, dressings, snack foods, deserts, gravies, processed meats including sausages, salamis, hot dogs as well as canned and re-constituted pet foods.

In order that the invention may be readily understood and put into practical effect, particular preferred embodiments will now be described by way of the following non-
5 limiting examples.

EXAMPLES

EXAMPLE 1

Preparation of a gluten substitute gum using tapioca starch and soybean flour

Ingredients	Gum #1	Gum #2	Gum #3	Gum #4	Gum #5
Tapioca starch	100 g	100 g	100 g	100 g	100 g
Soybean flour	25 g	37.5 g	20 g	10 g	5 g
Water	92 g	160 g	120 g	110 g	105 g

- 10 Each mixture of the above ingredients was blended into a wet paste, which was baked in a 750-Watt domestic microwave oven, on maximum setting at a rate of about 10 minutes per 2 x 100 g of paste. At 2 minutes this procedure yielded an aerated mass, which had expanded to about double the volume of the paste before baking. At 3 minutes the aerated mass had expanded to 3 times the volume of the paste before baking.
- 15 Temperature analysis revealed that the aerated mass was formed in the range of from about 130-133 °C. At 10 minutes this procedure produced a dried solid mass. The dried mass was allowed to cool for several minutes before it was milled and crushed into a powdered gum. It should be noted, however, that excess baking produces charring. Thus, for a given heating/baking apparatus care should be taken to determine the optimal baking period per
- 20 weight of paste. A person of skill in the art can determine these variables routinely in view of the present disclosure without undue experimentation.

A scaled-up preparation of Gum #5 was also carried out using a 6850-Watt microwave assisted heat pump drier. This preparation comprised baking 800 g of wet

paste for about 8-9 minutes at about 5000 Watts (power/weight of paste ratio of about 8-14:1). The dry gum thus produced had similar properties to Gum #5 produced with the domestic microwave.

EXAMPLE 2

5 Preparation of a gluten substitute gum by extrusion

- Dry powder (95 wt% tapioca starch, 5 wt% soybean flour) was fed into an extruder at a rate of 80 kg/hour. Steam was added to the dry powder in the preconditioner at a rate of 9.5 to 10.5 kg/hour. The process was started wet, and water addition into the barrel of the extruder was steadily reduced to increase pressure and therefore temperature.
- 10 Screw speed was also adjusted to keep motor amps (30 or 28 amps) (and therefore mechanical shear) as low as possible. A relatively high screw speed of (375 or 373 rpm) was used. The operating temperatures at which samples were collected are shown in the following table. No jacket heating was applied in Zone 5. Thus, Zone 5 temperature is a good indication of the maximum product temperature achieved.

Extrusion Parameter	Gum #6	Gum #7
Dry feed rate (kg/hour)	80	80
Steam addition to preconditioner (kg/hour)	10.3	9.5
Discharge temperature from preconditioner (°C)	45	48
Extruder screw speed (rpm)	375	373
Extruder motor amps	30	28
Water addition into barrel (kg/hour)	6.6	9.3
Temperature Zone 1 (°C)	43	47
Temperature Zone 2 (°C)	71	56
Temperature Zone 3 (°C)	78	60
Temperature Zone 4 (°C)	114	100
Temperature Zone 5 (°C)	149	144
Pressure at die (bar)	28	25

<i>Property</i>	<i>Gum M</i>	<i>Gum E</i>
<i>Weight per liter</i>	870 g	560 g
<i>Water absorption per 100 g of gum to form a solid mass</i>	92 g	50 g
<i>Gum characteristics</i>	<p>Rapidly disperse water through dry gum</p> <p>Forms a solid mass with strong cohesion</p> <p>Adheres to itself instead of other materials</p> <p>Has no perceptible odour</p> <p>Requires almost equal amounts of water to gum to form a mass</p> <p>Swells during absorption of water</p> <p>Weight to volume ratio similar to gluten</p>	<p>Does not disperse water through dry gum</p> <p>Forms a sticky liquid at point of contact with water. Water does not penetrate into dry gum.</p> <p>Initially adheres to other materials but becomes self-adherent with additional mixing.</p> <p>Has a fruit-like odour</p> <p>Requires about half the amount of water to gum to form a mass</p> <p>Contracts during absorption of water</p> <p>Weight to volume ratio smaller than gluten (<i>i.e.</i>, it has larger, lighter bulk)</p>
<i>Dough characteristics</i>	<p>Requires approx. 160 g/kg of gum to starch to make a dough</p> <p>Requires about 580 g water per kg flour to make a good dough (equivalent to wheat</p>	<p>Requires approx. 200 g/kg of gum to starch to make a dough</p> <p>Requires about 470 g water per kg flour to make a good dough (19% less than wheat flour)</p>

<i>Property</i>	<i>Gum M</i>	<i>Gum E</i>
<i>Bake characteristics</i>	<p>flour)</p> <p>Flour readily mixes with water to make a good dough</p> <p>Dough is mixed to similar consistency as wheat (moisture, feel, stretch and stickiness)</p> <p>Has single rise (in about 20 minutes @ 50°C)</p> <p>Will not rise further when baking heat applied</p>	<p>Flour forms a small central wet spot that must be mixed for several minutes to collect and incorporate loose flour</p> <p>Dough is mixed to a consistency which is not similar to wheat (feels much drier, does not have similar stretch characteristics)</p> <p>Has single rise (in about 30-40 minutes @ 50°C)</p> <p>Rises further when baking heat applied</p>

EXAMPLE 4*Preparation of a gluten substitute gum using tapioca, edible fat and edible protein*

Ingredients	Gum #8	Gum #9	Gum #10	Gum #11	Gum #12
Tapioca starch	50 g	50 g	50 g	50 g	50 g
Dried egg white	-	3 g	-	3 g	-
Olive oil	-	-	3 g	3 g	-
Whole milk powder (28wt% protein, 26wt% fat)	-	-	-	-	22 g
Water	50 g	50 g	50 g	50 g	50 g

- 5 Each mixture of the above ingredients was blended and subsequently baked for 10 minutes in a 750-Watt domestic microwave oven, on maximum setting. An aerated mass with similar properties to those of Example 1 was obtained with Gums #11 and 12.

EXAMPLE 5**Bread produced with Gum #5 and Maize Starch**

The flour mix used in this recipe is a blend of 500 parts maize starch to 60 parts soybean flour to 90 parts Gum #5.

Ingredients
580 g Flour
2 tablespoons (30 mL) dry yeast
2 teaspoons (10 mL) salt
1.5 tablespoons (22.5 mL) sugar
390 g water at 50 °C

5

Liberally grease a bread pan. Pre-heat an oven to 50 °C. Place all dry ingredients into a mixing bowl and mix. Add water (at 50 °C) and mix on low speed until combined. Keep mixing on medium speed until consistency is almost fluid. Turn out onto counter and lightly shape. Wait a minute or so before handling, as the dough cools it will form a
10 light skin. Divide into 2 balls and place into bread pan. Place into pre-warmed oven and turn off the heat. Allow to rise for 20 minutes - If you allow it to rise longer, it will collapse more when full heat is applied. Turn heat up to 180 °C and bake for 40 minutes. When baked turn out immediately or steaming will occur.

EXAMPLE 6**15 Shortcrust Pies produced with Gum #5 and Maize Starch**

The flour mix used in this recipe is a blend of 500 parts maize starch to 60 parts soybean flour to 90 parts Gum #5.

Ingredients
350 g flour

The flour mix used in this recipe is a blend of 500 parts maize starch to 60 parts
15 soybean flour to 90 parts Gum #5.

Ingredients
150 g flour
200 g caster sugar
35 g cocoa
60 g butter
120 g skim milk
3 teaspoons baking powder
1 teaspoon vanillin sugar
2 small (45-50 g) eggs

Pre-heat an oven to 180 °C. Add 2 teaspoons of baking powder to the flour. Add cocoa to flour and sift - ensure there are no lumps in the cocoa. Blend sugar, butter and 1 teaspoon vanillin sugar. When butter and sugar are blended add eggs and beat till creamy.

5 Mix in at low speed about 1/3 of the flour/cocoa and about 1/3 of the skim milk. Repeat until all the ingredients are combined - do not over beat. Pour into pan in layers and bake at 180 °C for 35 minutes

Throughout the specification the aim has been to describe the preferred

10 embodiments of the invention without limiting the invention to any one embodiment or specific collection of features. Those of skill in the art will therefore appreciate that, in light of the instant disclosure, various modifications and changes can be made in the particular embodiments exemplified without departing from the scope of the present invention. All such modifications and changes are intended to be included within the

15 scope of the appellant claims.

CLAIMS

1. A method of producing a gluten substitute gum, said method comprising heating a mixture comprising a starch, an edible fat, an edible protein and a liquid for a time and under conditions sufficient to form an aerated mass.

5 2. The method of claim 1, wherein the starch is present in an amount of between about 20 and 80% by weight of said mixture.

3. The method of claim 1, wherein the starch is present in an amount of between about 30 and 70% by weight of said mixture.

10 4. The method of claim 1, wherein the starch is present in an amount of between about 40 and 60% by weight of said mixture.

5. The method of claim 1, wherein the starch has less than 20 parts per million of gluten.

6. The method of claim 1, wherein the starch is selected from the group consisting of potato starch, sweet potato starch, white rice starch, glutinous rice starch, maize starch,
15 Codex Alimentarius wheat starch, sorghum starch, cassava starch, arrowroot starch and tapioca starch.

7. The method of claim 6, wherein the starch is selected from the group consisting of tapioca starch, arrowroot starch and maize starch.

8. The method of claim 7, wherein the starch is tapioca starch.

20 9. The method of claim 1, wherein the fat is derived from an animal source or a plant source.

10. The method of claim 9, wherein the fat is selected from the group consisting of canola oil, corn oil, grapeseed oil, soybean oil, sunflower seed oil, safflower oil, rapeseed oil, cottonseed oil, sesame oil, olive oil, palm oil, coconut oil, fish oil, copha, margarine,
25 butter, milk fat, chicken fat, lard and tallow, which may have been partially or completely hydrogenated or otherwise modified, non-toxic fatty materials having properties similar to triglycerides and any combination of the foregoing fats.

11. The method of claim 1, wherein the fat is present in an amount of between about 1 and 10% by weight of said mixture.

12. The method of claim 1, wherein the fat is present in an amount of between about 1 and 6% by weight of said mixture.

5 13. The method of claim 1, wherein the fat is present in an amount of between about 1 and 4% by weight of said mixture.

14. The method of claim 1, wherein the fat to starch ratio in said mixture is less than about 15:100.

15 10 15. The method of claim 1, wherein the fat to starch ratio in said mixture is less than about 12:100.

16. The method of claim 1, wherein the fat to starch ratio in said mixture is less than 10:100.

17. The method of claim 1, wherein the protein is derived from an animal source or a plant source.

15 18. The method of claim 17, wherein the protein is derived from a source selected from the group consisting of meat, poultry, eggs, milk, cheese, bean flour, rice flour, nuts and any combination thereof.

19. The method of claim 18, wherein the protein is selected from the group consisting of gelatine, whey, egg white, soybean protein and rice protein.

20 20. The method of claim 1, wherein the protein is present in an amount of between about 2 and 20% by weight of said mixture.

21. The method of claim 1, wherein the protein is present in an amount of between about 2 and 12% by weight of said mixture.

25 22. The method of claim 1, wherein the protein is present in an amount of between about 2 and 8% by weight of said mixture.

23. The method of claim 1, wherein the protein to starch ratio in said mixture is less

than about 30:100.

24. The method of claim 1, wherein the protein to starch ratio in said mixture is less than about 25:100.

25. The method of claim 1, wherein the protein to starch ratio in said mixture is less
5 than 20:100.

26. The method of claim 1, wherein the protein to fat ratio is about 3:1.

27. The method of claim 1, wherein the protein to fat ratio is about 2.5:1.

28. The method of claim 1, wherein the protein to fat ratio is about 2:1.

29. The method of claim 1, wherein the liquid is water.

10 30. The method of claim 29, wherein the water is present in an amount of between about 20 and 80% by weight of said mixture.

31. The method of claim 29, wherein the water is present in an amount of between about 30 and 70% by weight of said mixture.

32. The method of claim 29, wherein the water is present in an amount of between
15 about 40 and 60% by weight of said mixture.

33. The method of claim 1, wherein the fat and the protein are obtained from or provided in the form of a foodstuff containing both the fat and the protein.

34. The method of claim 33, wherein the foodstuff is selected from milk, egg and vegetable products.

20 35. The method of claim 33, wherein the foodstuff is a gluten-free flour.

36. The method of claim 35, wherein the flour is selected from the group consisting of buckwheat flour, sorghum flour, maize flour, white rice flour and soybean flour.

37. The method of claim 35, wherein the flour is soybean flour.

38. The method of claim 1, wherein the mixture is heated to a temperature of

between about 110 and 150 °C.

39. The method of claim 1, wherein the mixture is heated to a temperature of between about 120 and about 140 °C.

40. The method of claim 1, wherein the mixture is heated to a temperature of
5 between about 125 and 135 °C.

41. The method of claim 1, wherein the mixture is heated to a temperature of between about 130 and 133 °C.

42. The method of claim 1, wherein heating is effected by microwave energy.

43. The method of claim 1, wherein heating is effected by extrusion.

10 44. The method of claim 1, further comprising drying the aerated mass to form a dry aerated mass.

45. The method of claim 44, further comprising grinding or crushing the dry aerated mass to form a ground or powder.

46. A gluten substitute gum produced by the method of claim 1.

15 47. A plurality of ingredients in mix or in kit form for producing a gluten substitute gum, said ingredients comprising a starch, an edible fat and an edible protein which are present in relative amounts sufficient to form an aerated mass upon mixing with a predetermined amount of liquid and heating the mixture so formed at an aerated mass-forming effective temperature.

20 48. The ingredients of claim 47, wherein the fat is present in an amount between about 0.5 and 5% by weight of the ingredients in said mix or kit.

49. The ingredients of claim 47, wherein the fat is present in an amount between about 0.5 and 3% by weight of the ingredients in said mix or kit.

25 50. The ingredients of claim 47, wherein the fat is present in an amount between about 0.5 and 2% by weight of the ingredients in said mix or kit.

51. The ingredients of claim 47, wherein the fat to starch ratio in said mix or kit is less than about 15:100.

52. The ingredients of claim 47, wherein the fat to starch ratio in said mix or kit is less than about 12:100.

5 53. The ingredients of claim 47, wherein the fat to starch ratio in said mix or kit is less than 10:100.

54. The ingredients of claim 47, wherein the protein is present in an amount of between about 1 and 10% by weight of said the ingredients in said mix or kit.

10 55. The ingredients of claim 47, wherein the protein is present in an amount of between about 1 and 6% by weight of said the ingredients in said mix or kit.

56. The ingredients of claim 47, wherein the protein is present in an amount of between about 1 and 4% by weight of said the ingredients in said mix or kit.

57. The ingredients of claim 47, wherein the protein to starch ratio in said mix or kit is less than about 30:100.

15 58. The ingredients of claim 47, wherein the protein to starch ratio in said mix or kit is less than about 25:100.

59. The ingredients of claim 47, wherein the protein to starch ratio in said mix or kit is less than 20:100.

20 60. The ingredients of claim 47, wherein the protein to fat ratio in said mix or kit is about 3:1.

61. The ingredients of claim 47, wherein the protein to fat ratio in said mix or kit is about 2.5:1.

62. The ingredients of claim 47, wherein the protein to fat ratio in said mix or kit is about 2:1.

25 63. Use of a starch, an edible fat and an edible protein in the preparation of a mix or kit for the production of a gluten substitute gum.

65. Use of the gluten substitute gum of claim 46 in the preparation of a mix for producing foodstuffs including bakery products.

67. A food product produced using the gluten substitute gum of claim 46.

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ABSTRACT

5

GLUTEN SUBSTITUTES

10 A method is disclosed for producing a gluten substitute gum. The method comprises heating a mixture comprising a starch, an edible fat, an edible protein and a liquid for a time and under conditions sufficient to form an aerated mass. This aerated mass largely mimics gluten and may be used in combination with flours, whether gluten-free or otherwise, to form doughs for producing bakery products including breads cakes and pastries.

DOCKET NO. 15353

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

GLUTEN SUBSTITUTES

the specification of which

(check one)

☐ is attached hereto.

☒ was filed on 13 Sept. 2000 as a United States Application No. or PCT International Application Serial No. PCT/AU00/01089 and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37 Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 (a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT international application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s):

Number	Country	Date of Filing Day/Month/Year	Priority Claimed Under 35 U.S.C. 119
47543/99	Australia	14 September 1999	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below:

(Application Number)

(Filing Date)

(Application Number)

(Filing Date)

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35, United States Code, Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C.F.R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

PCT/AU00/01089
Application Serial No.

13 September 2000
Filing Date

Pending
Status

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

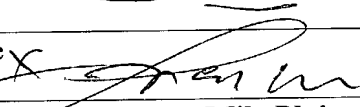
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